

Table 11. Comparison of Allowable Vegetation Conditions Following the Existing Maintenance Guidelines with Equivalent Vegetation Conditions Under the Proposed Project

Allowable Vegetation Condition (Attachment 2)	Acreage (Percent of Total Area) under Baseline Guideline	Acreage Maintenance Proposed
Code A	16 ac. (72 %)	14 ac. (31%)
Codes B, C, or D	6 ac. (26%)	18 ac. (39%)
Code E	0.5 ac. (0.3%)	14 ac. (31%)

An estimate of acreages affected by these maintenance activities for the three cross-sectional features are provided in Table 12.

3.2.2 Reach by Reach Maintenance Guidelines

Following is a reach by reach explanation of the recommended maintenance program guidelines:

All Reaches

Bridge Transition Areas: From Wooster Bridge to Cunningham Avenue. These maintenance active correspond to an area of approximately 0.5 acres (for the fourteen bridges along the project alignment).

Sediment Management: Bridge transition areas in all reaches, within approximately 100 feet upstream and downstream from bridges, shall be managed to remove sediment from the channel and inboard levee slopes when sediment accumulation exceeds 1 foot above the as-built invert.

Although no specific guideline for bridge transition areas were set under the maintenance baseline (Section 2.5) this criteria would not significantly increase the frequency and amount of sediment removal when compared to the maintenance baseline. This is principally because bridge transition areas correspond to less than 10% of the entire project length and that overall sediment accumulation would be significantly reduced under the proposed design.

Vegetation Management: Bridge transitions areas for all of the reaches would require special vegetation management treatment approximately 100 feet upstream to 100 feet downstream from the bridge faces. All flexible vegetation would be removed or maintained so that the vegetation is less than 1 foot high. Established woody vegetation (willows and cottonwoods) located in bridge transitions will be maintained so that overhanging branches that are at or below 20 feet above the channel invert and that are greater than 6 inches in diameter would be trimmed. New woody vegetation would not be permitted to establish in the bridge transitions.

Reaches 1a and 1d

Natural Earth Slopes with Raised Maintenance Road

Annual maintenance activities would include inspection and restoration of eroded bank, repair of raised maintenance roads, and weed abatement on raised maintenance roads.

Routine maintenance activities would include removal of woody vegetation and sediment from the waterway as described in the Maintenance Standards, Table 13. Refer to Attachment 1 for the typical cross-sections for Reaches 1a and 1d. The proposed limit for sediment removal is defined as the height of accumulated sediment that will push water half-way up the free-board elevation during a one percent flood event. New hydraulic modeling will be conducted to specify these limits for each sub-reach. Sediment removal frequency and quantities are expected to decrease after project implementation because of control of bank erosion within project area and because the sediment transport channel is specifically designed to optimize sediment transport. However sediment removal will still be required because of uncertainties associated with a mostly impermeable watershed as well as the potential for landslides in the upper watershed or if localized sediment deposit threatens the alignment of the sediment transport channel.

Woody vegetation is not allowed in the sediment transport channel. Selective application of herbicide would be conducted as needed between July 1st and March 15. to control woody growth in sediment transport channel. Vegetation in the “Committed Flood Conveyance Area” would be mowed or crushed every 2 years. Sediments would be removed from the floodplain area according to criteria described above.

Other maintenance activities would include monitoring and removing urban trash at least once a month. Downed trees of significant size and other debris causing or having the potential to cause channel blockage would be removed from the channel. Fencing would be repaired as necessary

Table 12
Lower Silver Maintenance Acreage for the Proposed Project

Reach ID	Stationing		Conveyance Area	Sediment Transport Channel	Riparian Area	
	U/S Station	D/S Station			Left Bank	Right Bank
1a	9+00	Confluence	1.40	0.82	0.18	1.22
1b	14+00	9+00	0.63	0.45	0.06	0.29
1c	28+00	14+00	1.20	1.43	0.17	0.69
1d	38+00	28+00	1.34	1.49	0.29	0.95
2	51+00	38+00	0.68	0.00	0.33	0.37
3a	54+00	70+00	1.93	0.94	0.19	1.22
3b	70+00	79+75	0.50	0.00	0.26	0.00
3c	79+75	100+70	0.55	0.60	0.26	0.00
3d	100+70	107+25	0.12	0.09	0.04	0.00
3e	107+25	114+00	0.72	0.51	0.11	0.58
3f	114+40	123+40	0.49	0.40	0.09	0.57
4a	127+64	131+71	0.09	0.21	0.10	0.05
4b	131+71	154+69	1.47	2.46	0.70	0.23
4c	157+00	170+07	0.78	0.58	0.39	0.12
5a	2766	2571.23	0.155	0.075	0.036	0.129
5b	3846	2766	0.232	0.506	0.161	0.385
5c	5816	3846	0.486	1.357	0.29	0.689
6a	7286	5816	0.351	1.051	0.329	0.657
6b	10000	7286	0.624	3.527	0.409	0.868
TOTAL			13.96	16.51	4.41	9.02
Notes:						
(1) Cross-Section View: from South to North, or from Left to Right when looking against flow direction						
(2) T.B.D. - To be determined for Final Submission						

Table 13
Lower Silver Maintenance Standards for Sediment Removal and Vegetation Management
Reaches 1a, 1d, 3a, 3e, 3f – Natural Earth Slopes

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Earth Bank	Bank erosion	5' from design condition	Restore eroded bank
	Right Bank ⁽¹⁾ Presence of vegetation	No limit	No maintenance required
	Left Bank ⁽¹⁾ Sediment accumulation	Sediments ⁽²⁾	Remove sediments
	Presence of woody vegetation	No woody vegetation allowed	Apply herbicide
Raised Maintenance Road	Presence of flexible and low growing vegetation	Height of tallest flexible vegetation exceeds 1'	Remove or cut vegetation to 4" or less
	Sediment accumulation	No sediment	Remove sediments whenever it is found
	Presence of vegetation	No vegetation on roads	Preemergent spray
	Presence of vegetation overhanging	Vegetation overhanging 6' into roadway	Cut back overhanging vegetation to edge of maintenance road
Floodplain	Sediment accumulation	Sediments ⁽²⁾	Remove sediments
	Presence of woody vegetation	No woody vegetation allowed	Apply herbicide
	Presence of flexible and low growing vegetation	Height of tallest flexible vegetation exceeds 1'	Remove or cut vegetation to 4" or less
	Excessive streambed scour	Expose 2' of concrete cutoff wall	Place rock, restore bed
Sediment Transport Channel	Sediment accumulation	Sediments ⁽²⁾	Remove sediments from the channel
	Presence of woody vegetation	No woody vegetation allowed	Apply herbicide
Note:			
(1) The convention for right and left banks is when facing upstream, bank on the left hand side is left bank, bank on the right hand side is right bank.			
(2) Sediment would be removed when accumulation would result in water level reaching half of freeboard level during a 1 percent flood event or determined by hydraulic analysis.			

Table 13 (Con'd.)
Lower Silver Maintenance Standards for Sediment Removal and Vegetation Management
Reaches 1b, 1c, 3c, 4b, 4c, 5 and 6 – Vegetated Block Walls/Gabion Baskets

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Vegetated Block Walls/Gabion Baskets			
Right Bank ⁽¹⁾	Presence of vegetation	No limit	No maintenance required
Left Bank ⁽¹⁾	Sediment accumulation	Sediments ⁽²⁾	Remove sediments
	Presence of woody vegetation	No woody vegetation allowed	Apply herbicide
	Presence of flexible and low growing vegetation	Height of tallest flexible vegetation exceeds 1'	Remove or cut vegetation to 4" or less
Raised Maintenance Road			
	Sediment accumulation	No sediment	Remove sediments whenever it is found
	Presence of vegetation	No vegetation on roads	Preemergent spray
	Presence of vegetation overhanging	Vegetation overhanging 6" into roadway	Cut back overhanging vegetation to edge of maintenance road
Floodplain			
	Sediment accumulation	Sediments ⁽²⁾	Remove sediments
	Presence of woody vegetation	No woody vegetation allowed	Apply herbicide
	Presence of flexible and low growing vegetation	Height of tallest flexible vegetation exceeds 1'	Remove or cut vegetation to 4" or less
Sediment Transport Channel			
	Excessive streambed scour	Expose 2' of concrete cutoff wall	Place rock, restore bed
	Sediment accumulation	Sediments ⁽²⁾	Remove sediments from the channel
	Presence of woody vegetation	No woody vegetation allowed	Apply herbicide
Note:			
(1) The convention for right and left banks is when facing upstream, bank on the left hand side is left bank, bank on the right hand side is right bank			
(2) Sediment would be removed when accumulation would result in water level reaching half of freeboard level during a 1 percent flood event or by hydraulic analysis.			

Table 13 (Con'd.)
Lower Silver Maintenance Standards for Sediment Removal and Vegetation Management
Reaches 2, 3a, 3d and 4a – Concrete Lined Channel

Facility Type	Maintenance Issue	Acceptable Maintenance Limit	Performance Criteria
Concrete Lined Channel	Sediments	Sediment depth (1)	Remove sediment
	Uniform surface abrasion	Surface roughness variation exceeds .04'	Resurface
	Local surface abrasion	Erosion of .2"	Resurface
Note:			
(1) Sediment would be removed when accumulation would result in water level reaching half of freeboard level during a 1 percent flood event or by hydraulic analysis.			

Reaches 1b and 1c

Gabion Baskets Slopes with Earth Bottom and Raised Maintenance Road

Annual maintenance activities would include inspection and repair of damaged gabion baskets, repair of raised maintenance roads, weed abatement on raised maintenance roads, restoration of scoured areas in the channel bottom, and weed control.

Routine maintenance activities are the same as ones described for Reaches 1a and 1d.

Reach 2

Concrete Lined Channel

Annual maintenance activities would include inspection and repair of abraded channel surface and damaged concrete wall, and weed abatement within the District right-of-way.

Routine maintenance activities would include removal of sediment in the waterway as described for Reaches 1a and 1d.

Reaches 3a, e and f

Natural Earth Slopes with Raised Maintenance Road

Annual and routine maintenance activities would be the same as for Reaches 1a and 1d.

Reaches 3b and 3d

Concrete Lined Channel with Fixed Low-flow Channel

Annual and routine maintenance activities would be the same as for Reach 2.

Reach 3c

Near-Vertical Gabion Walls with Earth Bottom and Raised Maintenance Road

Annual maintenance activities would be the same as Reach 2.

Routine maintenance activities would be the same as for Reaches 1a and 1d.

Reaches 4, 5 and 6

Vegetated Blocks/Gabion Baskets Slopes with Earth Bottom and Raised Maintenance Road

Annual and routine maintenance activities would be the same as for Reaches 1a and 1d.

3.3 Best Management Practices

Best Management Practices (BMPs) are methods that protect environmental quality or reduce environmental impacts from stream maintenance activities. The District has developed BMPs and included them in the SMP under Appendix G. The maintenance activities for the Project will be subject to the BMPs listed under the Stream Maintenance Program and will be applied as described below. In order to be effective, BMPs must be properly selected and implemented, applied consistently, and their effectiveness evaluated onsite to assure that they are meeting the required objective.

Not every BMP is designed to be used in every situation. Since BMPs are meant to be specific to particular activities and resources, the selection and implementation of an appropriate set of BMPs for each project is a key element to their effectiveness. The District will use the most current BMPs when planning or designing routine stream maintenance activities.

Selection of BMPs for regularly scheduled work will be done at the beginning of each season (coincides with activity type). At the beginning of the season, technical staff will review all of the work areas and select appropriate BMPs to respond to site conditions. The BMPs will be incorporated into the work order.

The watershed engineer will, as part of the project design criteria, select BMPs that are appropriate to the particular job and incorporate them into the design package. These BMPs will be called out in the design documents and incorporated into the work order.

BMPs will be implemented by the lead staff assigned to a specific project. For most projects this would be the Senior Maintenance Worker. The BMPs will be implemented as they are called out in the work order. If site conditions or other factors require a BMP to be changed or make it no longer relevant to the project, the assigned lead on the job will consult with appropriate staff and get authorization to modify the BMPs. Modifications to BMPs will be noted as an addendum to the work order.

Monitoring of BMPs will be carried out as part of the work and assigned to the lead staff on a particular project as a general rule. Exceptions would be where the individual BMP requires a particular field of expertise to carry out the monitoring (i.e. water quality sampling, fisheries monitoring). In that instance, qualified staff would be included in the work order as a resource from BMP implementation.

The BMPs section of the SMP is intended to be a living document and to change over the life of the program. The annual Resource Protection Protocol includes a “lessons learned” step to evaluate and improve all aspects of the maintenance program, including the BMPs. As BMPs are used and ways are seen to improve their effectiveness, they will be modified to reflect the changes. As new BMPs are found or technology improves, they will be incorporated under the maintenance plan. Reporting on modification to BMPs made as a result of the “lessons learned” process will be done as part of the normal reporting practices called out in the SMP.

Attachment 1: Proposed Project Typical Cross-Sections for Reaches 1 through 6

Attachment 2: Vegetation Codes (from SMP 2001)

Attachment 3 BMPs (from SMP 2001)
